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Variations of Instinct.

It is into the history of the hive-bee that we must look for the most striking examples of variation of instinct; and here, as in every thing relating to this insect, the work of the elder Huber is an unfailing source of the most novel and interesting facts.

It is the ordinary instinct of bees to lay the foundation of their combs at the top of the hive, building them perpendicularly *downwards;* and they pursue this plan so constantly, that you might examine a thousand (probably ten thousand) hives without finding any material deviation from it. Yet Huber in the course of his experiments forced them to build their combs perpendicularly upward; and, what seems even more remarkable, in an horizontal direction.

The combs of bees are always at an uniform distance from each other, namely, about one third of an inch, which is just wide enough to allow them to pass easily and have access to the young brood. On the approach of winter, when their honey-cells are not sufficient in number to contain all the stock, they *elongate* them considerably, and thus increase their capacity. By this extension the intervals between the combs are unavoidably contracted; but in winter well-stored magazines are essential, while from their state of comparative inactivity spacious communications are less necessary. On the return of spring, however, when the cells are wanted for the reception of eggs, the bees contract the elongated cells to their former dimensions, and thus re-establish the just distances between the combs which the care of their brood requires. But this is not all. Not only do they elongate the cells of the old combs when there is an extraordinary harvest of honey, but they actually give to the new cells which they construct on this emergency a much greater *diameter* as well as a greater depth.

The queen-bee in ordinary circumstances places each egg in the centre of the pyramidal bottom of the cell, where it remains fixed by its natural gluten; but in an experiment of Huber, one whose fecundation had been retarded had the first segments of her abdomen so swelled that she was unable to reach the bottom of the cells. She therefore attached her eggs (which were those of males) to their lower side, two lines from the mouth. As the larvæ always pass that state in the place where they are deposited, those hatched from the eggs in question remained in the situation assigned them. But the working-bees, as if aware that in these circumstances the cells would be too short to contain the larvæ when fully grown, *added to their length*, even before the eggs were hatched.

Bees close up the cells of the grubs, previous to their transformation, with a cover or lid of wax; and in hanging its abode with a silken tapestry before it assumes the pupa state, the grub requires that the cell should not be too short for its movements. Bonnet having placed a swarm in a very flat glass hive, the bees constructed one of the combs parallel to one of the principal sides, where it was so straigh that they could not give to the cells their ordinary depth. The queen, however, laid eggs in them, and the workers daily nourished the grubs, and closed the cells at the period of transformation. A few days afterwards he was surprised to perceive in the lid holes more or less large, out of which the grubs partly projected, the cells having been too short to admit of their usual movements. He was curious to know how the bees would proceed. He expected that they would pull all the grubs out of the cells, as they commonly do when great disorders in the combs take place. But he did not sufficiently give credit to the resources of their instinct. They did not displace a single grub—they left them in their cells; but as they saw that these cells were not deep enough, they closed them afresh with lids much more convex than ordinary, so as to give them a sufficient depth; and from that time no more holes were made in the lids.

The working bees, in closing up the cells containing larvæ, invariably give a convex lid to the large cells of drones, and one nearly flat to the smaller cells of workers; but in an experiment instituted by Huber to ascertain the influence of the size of the cells on that of the included larvæ, he transferred the larvæ of workers to the cells of drones. What was the result? Did the bees still continue blindly to exercise

their ordinary instinct? On the contrary, they now placed a nearly *flat* lid upon these large cells, as if well aware of their being occupied by a different race of inhabitants.

On some occasions bees, in consequence of Huber's arrangement in the interior of their habitations, have begun to build a comb nearer to the adjoining one than the usual interval: but they soon appeared to see their error, and corrected it by giving to the comb a gradual curvature, so as to resume the ordinary distance.

In another instance in which various irregularities had taken place in the form of the combs, the bees, in prolonging one of them, had, contrary to their usual custom, begun two separate and distinct continuations, which in approaching instead of joining would have interfered with each other, had not the bees, apparently foreseeing the difficulty, gradually bent their edges so as to make them join with such exactness that they could afterwards continue them conjointly.

In constructing their combs, bees form the first range of cells—that by which the comb is attached to the top of the hive—of a different shape from the rest. Each cell, instead of being hexagonal, is pentagonal, having the fifth broadest side fixed to the top of the hive, whence the comb is much more securely cemented to that part than if the first range of cells had been of the ordinary construction. For some time after their fabrication the combs remain in this state; but at a certain period the bees attack the first range of cells as if in fury, gnaw away the sides without touching the lozenge-shaped bottoms; and having mixed the wax with propolis, they form a cement well known to the ancients under the name of *Mitys*, *Commosis*, and *Pissoceros*, which they substitute in the place of the removed sides of the cells, forming of it thick and massive walls and heavy and shapeless pillars, which they introduce between the comb and the top of the hive so as to agglutinate them firmly together. Huber, who first in modern times witnessed this remarkable modification of the architecture of bees, observed that not only are they careful not to touch the bottoms of the cells, but that they do not remove at once the cells on both sides of the comb, which in that case might fall down; but they work alternately, first on one side and then on the other, replacing the demolished cells as they proceed with mitys, which firmly fixes the comb to its support.

The object of this substitution of mitys for wax seems clear. While the combs are new and only partially filled with honey, the first range of cells, originally established as the base and the guide for the pyramidal bottoms of the subsequent ones, serve as a sufficient support for them; but when they contain a store of several pounds, the bees seem to foresee the danger of such a weight proving too heavy for the thin waxen walls by which the combs are suspended, and providently hasten to substitute for them thicker walls, and pillars of a more compact and viscid material.

But their foresight does not stop here. When they have sufficient wax, they make their combs of such a breadth as to extend to the sides of the hive, to which they cement them by constructions approaching more or less to the shape of cells. But when a scarcity of wax happens before they have been able to give to their combs the requisite diameter, a large vacant space is left between the edges of these combs, which are only fixed by their upper part, and the sides of the hive; and they might be pulled down by the weight of the honey, did not the bees ensure their stability by introducing large irregular masses of wax between their edges and the sides of the hive. A striking instance of this art of securing their magazines occurred to Huber. A comb, not having been originally well fastened to the top of his glass hive, fell down during the winter amongst the other combs, preserving, however, its parallelism with them. The bees could not fill up the space between its upper edge and the top of the hive, because they never construct combs of old wax, and they had not then an opportunity of producing new: at a more favorable season they would not have hesitated to build a new comb upon the old one; but it being inexpedient at that period to expend their provision of honey in the elaboration of wax, they provided for the stability of the fallen comb by another process. They furnished themselves with wax from the other combs, by gnawing away the rims of the cells more elongated than the rest, and then betook themselves in crowds, some upon the edges of the fallen comb, others between its sides and those of the adjoining combs; and there securely fixed it, by constructing several *ties* of different shapes between it and the glass of the hive: some were pillars, others buttresses, and others beams artfully disposed and adapted to the localities of the surfaces joined. Nor did they content themselves with repairing the accidents which their masonry had experienced; they provided against those which might happen, and appeared to profit by the warning given by the fall of one of the combs to consolidate the others, and prevent a second accident of the same nature. These last had not been displaced and appeared solidly attached by their base; whence Huber was not a little surprised to see the bees strengthen their principal points of connection by making them much thicker than before with old wax, and forming numerous ties and braces to unite them more closely to each other and to the walls of their habitation. What was still more extraordinary, all this happened in the middle of January, at a period when the bees ordinarily cluster at the top of the hive, and do not engage in labors of this kind.

You will admit, I think, that these proofs of the resources of the architectural instinct of bees are truly admirable. If, in the case of the substitution of mitys for the first range of waxen cells, this procedure *invariably* took place in *every* bee-hive at a *fixed* period—when, for example, the combs are two thirds filled with honey—it would be less surprising; but there is nothing of this invariable character about it. It does not, as Huber expressly informs us, occur at any marked and regular period, but appears to depend on several circumstances not always combined. Sometimes the bees content themselves with bordering the sides of the upper

cells with propolis alone, without altering their form or giving them greater thickness. And it is not less remarkable that, from the instances last cited, it appears that they are not confined to one kind of cement for strengthening and supporting their combs, but avail themselves of propolis, wax, or a mixture of both, as circumstances direct.

Not to weary you with examples of the modifications of instinct we are considering, I shall introduce but three more:—the first, of the mode in which bees extend the dimensions of an old comb; the second of that which they adopt in constructing the male cells and connecting them with the smaller cells of workers; and the last, of the plan pursued by them when it becomes necessary to bend their combs.

You must have observed that a comb newly made becomes gradually thinner at its edges, the cells there, on each side, progressively decreasing in length; but in time these marginal cells, as they are wanted for the purposes of the hive, are elongated to the depth of the rest. Now suppose bees, from an augmentation of the size of their hive, to have occasion to extend their combs either in length or breadth, the process which they adopt is this:—they gnaw away the tops of the marginal cells until the combs have resumed their original lenticular form, and then construct upon their edges the pyramidal lozenge-shaped bottoms of cells, upon which the hexagonal sides are subsequently raised, as in their operation of cell-building. This course of proceeding is invariable: they never extend a comb in any direction whatever without having first made its edges thinner, diminishing its thickness in a proportion sufficiently large to leave no angular projection. Huber observes, and with reason, in relating this surprising law which obliges bees partially to demolish the cells situated upon the edge of the combs, that it deserves a more close examination than he found himself competent to give it; for if we may to a certain point form a conception of the instinct which leads these animals to employ their art of building cells, yet how can we conceive of that which in particular circumstances forces them to act in an opposite direction, and determines them to *demolish* what they have so laboriously constructed?

Drones or male bees, are more bulky than the workers; and the cells which bees construct for rearing the larvæ of the former are larger than those destined for the education of the larvæ of the latter. The diameter of the cells of drones is always 3½ lines (or twelfths of an inch), that of those of workers 2½ lines; and these dimensions are so constant in their ordinary cells, that some authors have thought they might be adopted as an universal and invariable scale of measure, which would have the great recommendation of being everywhere at hand, and at all events would be preferable to our *barley-corns*. Several ranges of male cells, sometimes from thirty to forty, are usually found in each comb, generally situated about the middle. Now as these cells are not isolated, but form a part of the entire comb, corresponding on its two faces—by what art is it that the bees unite hexagonal cells of a small with others of a larger diameter, without leaving any void spaces, and without destroying the uniformity and regularity of the comb? This problem would puzzle an ordinary artist, but is easily solved by the resources of the instinct of our little workmen.

When they are desirous of constructing the cells of males below those of workers, they form several ranges of intermediate or transient cells, of which the diameter augments progressively, until they have reached the range where the male cells commence; and in the same manner, when they wish to revert to the modelling of the cells of workers, they pass by a gradual decreasing graduation to the ordinary diameter to the cells of this class. We commonly meet with three or four ranges of intermediate cells before coming to those of males; the first ranges of which participate in some measure in the irregularity of the former.

But it is upon the construction of the *bottoms* of the intermediate ranges of cells that this variation of their architecture chiefly hinges. The bottoms of the regular cells of bees are, as you are aware, composed of *three* equal-sized rhomboidal pieces; and the base of a cell on one side of the comb is composed of portions of the bases of *three* cells on the other; but the bottoms of intermediate cells in question (though their orifices are perfectly hexagonal) are composed of *four* pieces, of which two are hexagonal and two rhomboidal; and each instead of corresponding with three cells on the opposite side corresponds with *four*. The size and the shape of the four pieces composing the bottom vary; and these intermediate cells, a little larger than the third part of the three opposite cells, comprise in their contour a portion of the bottom of the fourth cell. Just below the last range of cells with regular pyramidal bottoms are found cells with bottoms of four pieces, of which three are very large, and one very small, and this last is a rhomb. The two rhombs of the transition cells are separated by a considerable interval; but the two hexagonal pieces are adjacent and perfectly alike. A cell lower, we perceive that the two rhombs of the bottom are not so unequal; the contour of the cell has included a greater portion of the opposite fourth cell. Lastly, we find cells in pretty considerable number of which the bottom is composed of four pieces perfectly regular—namely, two elongated hexagons and two equal rhombs, but smaller than those of the pyramidal bottoms. In proportion as we remove our view from the cells with regular tetrahedral bottoms, whether in descending or from right to left, we see that the subsequent cells resume their ordinary form: that is to say, that one of their rhombs is gradually lessened until it finally disappears entirely; and the pyramidal form re-exhibits itself, but on a larger scale than in the cells at the top of the comb. This regularity is maintained in a great number of ranges, namely, those consisting of male cells; afterwards the cells diminish in size, and we again remark the tetrahedral bottoms just described, until the cells have once more resumed the proper diameter of those of workers.

It is, then, by encroaching in a small degree

upon the cells of the other face of the comb, that bees at length succeed in giving greater dimensions to their cells; and the graduation of the transition cells being reciprocal on the two faces of the comb, it follows that on both sides each hexagonal contour corresponds with four cells. When the bees have arrived at any degree of this mode of operating, they can stop there and continue to employ it in several consecutive ranges of cells; but it is to the intermediate degree that they appear to confine themselves for the longest period, and we then find a great number of cells of which the bottoms of four pieces are perfectly regular. They might, then, construct the whole comb on this plan if their object were not to revert to the pyramidal form with which they set out. In building the male cells, the bees begin their foundation with a block or mass of wax thicker and higher than that employed for the cells of workers, without which it would be impracticable for them to preserve the same order and symmetry in working on a larger scale.

Irregularities (to use the language of Huber, from which the above details are abstracted) have often been observed in the cells of bees. Reaumur, Bonnet, and other naturalists, cite them as so many examples of imperfections. What would have been their astonishment if they had been aware that part of these anomalies are *calculated*; that there exists, as it were, a movable harmony in the mechanism by which the cells are composed? If, in consequence of the imperfection of their organs, or of their instruments, bees occasionally constructed some of their cells unequal, or of parts badly put together, it would still manifest some talent to be able to repair these defects, and to compensate one irregularity by another; but it is far more astonishing that they know how to quit their ordinary routine when circumstances require that they should build male cells; that they should be instructed to vary the dimensions and the shape of each piece so as to return to a regular order; and that, after having constructed thirty or forty ranges of male cells, they again leave the regular order on which these were formed, and arrive by successive dimunitions at the point from which they set out. How should these insects be able to extricate themselves from such a difficulty—from such a complicated structure? how pass from the little to the great, from a regular plan to an irregular one, and again resume the former? These are questions which no known system can explain.

It is observed by Mr. P. Huber, in his appendix to the account of his father's discoveries relative to the architecture of bees, that in general the form of the prism or tubes of the cells is more essential than that of their bottoms, since the tetrahedral-bottomed transition cells, and even those cells which being built immediately upon wood or glass were entirely without bottoms, still preserved their usual shape of hexagonal prisms. But a remarkable experiment of the elder Huber shows that bees can alter even the form of their cells when circumstances require it, and that in a way which one would not have expected.

Having placed in front of a comb which the bees were constructing a slip of glass, they seemed immediately aware that it would be very difficult to attach it to so slippery a surface; and instead of continuing the comb in a straight line, they *bent it at a right angle*, so as to extend beyond the slip of glass and ultimately fixed it in an adjoining part of the wood-work of the hive which the glass did not cover. This deviation, if the comb had been a mere simple and uniform mass of wax, would have evinced no small ingenuity; but you will bear in mind that a comb consists on each side, or face, of cells having between them bottoms in common; and if you take a comb, and, having softened the wax by heat, endeavor to bend it in any part at a right angle, you will then comprehend the difficulties which our little architects had to encounter. The resources of their instinct, however, were adequate to the emergency. They made the cells on the *convex* side of the bent part of the comb much *larger*, and those on the *concave* side much *smaller* than usual; the former having three or four times the diameter of the latter. But this was not all. As the bottoms of the small and large cells were as usual common to both, the cells were not regular prisms, but the small ones considerably wider at the bottom than at the top, and conversely in the large ones. What conception can we form of so wonderful a flexibility of instinct? How, as Huber asks, can we comprehend the mode in which such a crowd of laborers, occupied at the same time on the edge of the comb, could agree to give to it the same curvature from one extremity to the other; or how could they arrange together to construct on one face cells so small, while on the other they imparted to them such enlarged dimensions? And how can we feel adequate astonishment that they should have the art of making cells of such different sizes correspond?

After this long but I flatter myself not wholly uninteresting enumeration, you will scarcely hesitate to admit that insects, and of these the bee preeminently, are endowed with a much more exquisite and flexible instinct than the larger animals. But you may be here led to ask, Can all this be referred to instinct? Is not this pliability to circumstances—this surprising adaptation of means for accomplishing an end—rather the result of *reason?*

You will not doubt my allowing the appositeness of this question, when I frankly tell you that so strikingly do many of the preceding facts seem at first view the effect of reason, that in my original sketch of the letter you are now reading, I had arranged them as instances of this faculty. But mature consideration has convinced me (though I confess the subject has great difficulties) that this rule was fallacious; and that though some circumstances connected with these facts may be referable to reason, the facts themselves can only be consistently explained by regarding them as I have here done, as examples of variations of particular instincts:—and this on two accounts.

In the first place, these variations, however singular, are *limited* in their extent: all bees are, and have always been, able to avail them-

selves of a certain number, but not to increase that number. Bees cemented their combs, when becoming heavy, to the top of the hive with mitys, in the time of Aristotle and Pliny as they do now; and there is every reason to believe that then, as now, they occasionally varied their procedures, by securing them with wax or with propolis only, either added to the upper ranges of cells, or disposed in braces and ties to the adjoining combs. But if in thus proceeding they were guided by reason, why not under certa n circumstances adopt *other* modes of strengthening their combs? Why not, when wax and propolis are scarce, employ *mud*, which which they might see the martin avail herself of so successfully? Or why should it not come into the head of some hoary denizen of the hive, that a little *mortar* with which his careful master plasters the crevices between his habitation and its stand might answer the end of mitys? We might say of the phenomena in question—Show us but *one* instance of bees having submitted mud or mortar for mitys, pissoceros, or propolis, or wooden props for waxen ties, and there could be no doubt of their being here guided by reason. But since no such instance is on record; since they are still confined to the same limits—however surprising the range of these limits—as they were two thousand years ago; and since the bees emerged from their pupæ but a few hours before will set themselves as adroitly to work, and pursue their operations as scientifically as their brethren, who can boast the experience of a long life of twelve months duration; we must still regard these actions as variations of instinct.

In the second place, no degree of reason that we can with any share of probability attribute to bees could be competent to the performance of labor so complicated as those we have been considering, and which, if the result of reason, would involve the most extensive and varied knowledge in the agents. Suppose a man to have attained by long practice the art of modelling wax into a congeries of uniform hexagonal cells, with pyramidal bottoms composed each of three rhombs, resembling the cells of workers among bees. Let him now be set to make a congeries of similar but larger cells (answering to the male cells), and unite these with the former by other hexagonal cells, so that there should be no disruption in the continuity or regularity of the whole assemblage, and no vacant intervals or patching at the junctions either of the tubes or the bottoms of the cells; and you would have set him no very easy task—a task, in short, which it may be doubted if he would satisfactorily perform in a twelvemonth, though gifted with a clear head and a competent store of geometrical knowledge, and which, if destitute of these requisites, it may be safely asserted that he would never perform at all. How then can we imagine it possible that this difficult problem, and others of a similar kind, can be so completely and exactly solved by animals of which some are not two days old, others not a week, and probably none a year? The conclusion is irresistible—it is not *reason* but *instinct* that is their guide.

KIRBY & SPENCE.

POMEROY, O., *April* 6, 1876.

MRS. E. S. TUPPER:

In your "Letter III," published in the *Prairie Farmer* of the 30th ultimo, I was pleased to see presented, in a very condensed form, the economy of the bee-hive, which, although not new to me, was nevertheless interesting and instructive. The theory that worker-bees are undeveloped or imperfectly developed females is fully sustained by the researches of the most distinguishd apiarians.

But the thoughts which have been suggested by these facts have led me a step beyond the practical. I could not resist the temptation to speculate about the *manner* of producing the difference between queens and workers, for, according to the admitted and current theory on the subject, there existed the embryo of a perfect female in all the eggs, which afterwards became workers. The mere statement of the matter suggests the idea, that the *change*, whatever it may be, is necessary to produce the worker, otherwise all eggs would become queens.

How this change is produced and what it is, we have no means to decide with certainty, because positive and direct evidence is wanting on the subject. But the known facts and circumstances connected with this interesting subject induce me to believe that the Creator, in bestowing upon bees their instincts, taught the workers not only to *feed* the young bees in their larva state, but also to perform a *surgical operation*, (I can find no other terms to express the idea,) in which the ovary of each little worm, in a worker cell, is destroyed.

Among the facts that point to the truth of this conclusion I will name but a few. For instance, the fact that after a certain age of the larva in a worker cell a queen cannot be produced from it, and the occasional imperfect development of the ovary in a worker, are facts that convince me that something more is necessary to produce the difference between the queen and worker bees than mere extra care and the "royal food" we read about.

The operation suggested I think will also account for the difference in the time required to develop and mature the queen and worker—seventeen days for the first, and twenty-one for the latter.

But in the nests of other bees, such as the humble-bee, hornet, yellow-jacket, &c., there are workers during all the summer and early part of autumn. The individuals of these insects which make their appearance first in the spring are the mothers of the colonies found in mid-summer and much larger than their progeny. The last brood of the sea on, however, are as large as the mother was in the spring. Of these, as many as survive the winter start again, single-handed, as the head and mother of a new colony. The inference is, that the workers are produced in the same manner as above suggested in the case of the honey-bee. If it is said that the instincts and habits of the queen differ materially from the instincts and habits of workers, it is answered that they are differently constituted; and all over the animal kingdom *instinct accords with constitution*. We

are not wanting in examples of domestic animals having their habits and instincts changed in accordance with a material alteration of their constitution. That a queen bee does not secrete wax is sufficiently accounted for by the fact that she lays her hundreds and perhaps thousands of eggs per day. And after this manner other differences may be reconciled.

As your article above referred to introduced this subject, I thought I should be pardoned in making these additional suggestions, in the hope that you may publish another article inviting further investigations upon this very interesting subject. Every effort at discovering the operations of nature, secret or open, is sure to enhance in our esteem the wisdom and goodness of the Great Giver of all things, although we may not succeed in the particular purpose with which we started out.

I am, very truly, yours,

MARTIN HECKARD.

For the American Bee Journal and Gazette.

Bee Battles Again.

If I have not trespassed too much upon your patience by my communication published in the April number of the JOURNAL, I beg to send you an account of one of the battles which occurred in my apiary in the fall of '65. That year the spring pasture was very good, and all stocks swarmed two or three times; but early in June the terrible drought set in, and continued until about the middle of September.

In consequence of the total failure of the summer flowers, the late swarms were in a starving condition. One morning in the latter part of September or first of October, I was much surprised to see that violent efforts were being made to rob (as I thought,) one of my strongest hives, but upon making a closer examination, I found that one of my after swarms, being entirely without honey, had deserted its hive, and made an attack upon its more wealthy neighbor.

The main body of assailants hung in a cluster under the portico of the hive, and made frequent rushes for the entrance. Fortunately the blocks were not more than an inch apart, and the defenders easily held their ground. Now and then a party of the besieged would sally forth, when a skirmish in the air would take place, each bee stinging an enemy and never relinquishing her hold until one or the other fell to the ground dead or wounded.

The fight continued several hours, and when it was over, the ground was covered with dead bees for several rods around the hive, and the attackers had disappeared. Whether they were all killed or whether some succeeded in joining the hive, I am unable to say. Soon after the fight began, I found the queen of the swarm in front of the hive they had attacked, and removed her: but her bees did not seem to be affected in the least about her loss. This same scene was reënacted in several of my hives, and in every instance the aggressors were desitute of stores.

W.

ELKRIDGE, MD., April 24th, 1867.

For the American Bee Journal and Gazette.

MR. EDITOR: Since writing the first article on the kind of hive I use, in your journal, I have had a number of inquiries for a better description of the hive. In order to answer them all, I will just say it is the Kelsey hive, with the lower apartment cut down to 12 inches in height, frames and all; with the permanent division board taken out, and three more frames inserted, with a channel cut in the bottom board for entrance, instead of bottom of hive; and a transient division board to divide off the hive for raising queens, building up colonies, &c. I raise my queens in this hive in preference to the miniature hives. By raising queens in this way, and leaving her in the hive long enough for her brood to mature before taking her away I can build up a good colony by fall, and raise a succession of queens all summer. Thus you perceive there is no cutting or mutilating comb, and no loss in any way; for all the comb your queen-raising colony builds is all right, providing you do allow them to build comb only while they have a fertile queen. And here let me say that in dividing a swarm by making two out of one, in the manner the most of people do it, and trusting to one part raising a queen, is the ruin of more stocks than almost anything else, except bad wintering. The old colony where the queen is should be kept strong and numerous under all circumstances; and you should build up your young colony as soon as they have a fertile queen, by the help of the old one. I have taken away one frame from a numerous colony, and had them to fill an empty one with comb in one night, and the queen has nearly filled it with eggs in the same time.

ELISHA GALLUP.

OSAGE, IOWA, April 22, 1867.

For the American Bee Journal and Gazette.

Another of those Exceptions which Prove the Rule.

On opening a small hive in which had been left only one queen-cell, I found that from it had hatched a crippled Italian queen. Her wings were imperfect, one of them was wanting, and there was some trouble with her legs, one of them appearing to be useless. I should have killed her at once, but eggs from pure queens were not at that time very plenty, and I knew that to take her away would make the others uneasy, unless I supplied them with the means of rearing another, so I left her unharmed for a while. More than a week after on opening the hive to destroy her, I found eggs in it, and her appearance indicated that she was fertile. Supposing she would deposit only drone eggs, I was about to kill her, when a friend with me proposed that I let her be and see the result. In three weeks fine workers appeared, afterwards some drones, and when as an experiment I changed her from that hive into another, the bees reared some fine queens from the eggs she left. It seems impossible that she could fly; how then was she fertilized? Has any one observed a similar instance?

ELLEN S. TUPPER.

BRIGHTON, IOWA.

The Old Bee.

[From the German of Johann Baumann.]

BY "A DEVONSHIRE BEE-KEEPER."

How many journies hast thou travell'd
To distant hills—to distant vales,—
How oft the leafy maze unravell'd
Where daylight into twilight pales;
With wing untiring day by day,
From morning's dawn till ev'ning gray.

With honey or with pollen freighted
Often and often can'st thou home;
Brief was thy rest when overweighted,
But prompt to fill the waxen comb;
Sole end and aim of all thy zeal
The progress of the common weal.

If when on guard before the city
Thy post were threatened by the foe,
Then undeterr'd by ruth or pity
All hostile schemes thou'dst overthrow.
He who attack'd whilst thou hadst breath
Trod but the path that led to death.

To build the combs thy aid was given,
To feed the brood, to rear the young;
With willing mind and temper even,
With active limb and pliant tongue;
By day or night no rest for thee;
Say, if on earth thy equal be?

Labor and toil thy portion ever,
Thou faithful, clever, noble thing!
What thy reward for such endeavor—
What crowning blessing doth it bring?—
Without remorse, when old and gray,
To starve and die thou'rt turned away.

Thy wings that erst were full and rounded,
By willing toil are chafed and worn;
Yet with submission still unbounded
Thou tak'st thy last sad flight forlorn,
And slowly flutt'ring to the earth
Forsak'st the home that gave thee birth.

T. W. WOODBURY.

MOUNT RADFORD, EXETER, 16th August, 1865.

For the American Bee Journal and Gazette.

Another Instance of Two Queens in One Hive.

On examining a nucleus hive in which I was rearing queens, just at night, I found a fine young Italian just hatched. As there was little if any brood in the hive I went hastily to a good strong colony and took out a frame of brood to give to the small one, to prevent the bees leaving when the queen made her flight. Two days after, on examining the hive to see if the queen was depositing eggs, I found on the first frame that I lifted out an old queen with one wing clipped and the cells all filled with eggs. I knew the queen as the mother of the colony from which I had taken the brood comb so hurriedly. On the other frame I found my young queen unharmed, quite contrary to my expectation. To observe the ending of the matter I left both in it. Several days of bad weather followed. I looked in the hive each afternoon, and found both queens doing well. Then came a bright warm day, and about noon, as I passed the hive, I saw the bees dragging out what proved to be my young queen, and on opening it, the old one was found in full possession.

My inference is that the young one left the hive and had been fertilized, and on her return was killed by either queen or workers, who before had not distinguished her from a common bee.

ELLEN S. TUPPER.

BRIGHTON, IOWA.

For the American Bee Journal and Gazette.

Bees in Canada.

MR. EDITOR: As I have not seen any notes in your valuable JOURNAL from subscribers in Canada, I thought if you would accept of some from a bungler like myself, that I would occasionally forward some to you. I am always glad to hear from bee-keepers of my native land, (the United States,) and perhaps they would like occasionally to hear from us here in Canada. I will send you a few notes now, and if you think them worth anything for your JOURNAL you can use them.

Last season was the poorest season for bees that we have had for a number of years. The spring was fine and warm, and bees began to breed finely, and drones began to make their appearance, and there were all signs of early swarms; when of a sudden the weather changed, and a number of weeks of cold raw weather followed. Bees could not work, and they nearly stopped breeding. They also killed off their drones, and the consequence was, bee-keepers that depended on natural swarming did not get any swarms until the season was so far advanced that the young swarms did not gather honey enough to carry them through the winter. Of course many bee-keepers have lost a number of stocks, and are feeding and will have to feed a good many more to keep them alive until they can gather for themselves. But we are hoping for a better season this year, although it would look to some just now rather doubtful; for there has been but two or three days warm enough for bees to gather pollen, and to-day, April 24, the snow has fallen two or three inches deep. But I think we shall perhaps escape the long cold spell we had last year. The Italian bees do far better here than the common bees. They were introduced here some three years ago, by myself and my brother, and now there are a good number of stocks scattered through Canada, and we are sending out a good many queens every season. I hope soon to see them take the place of the common bees altogether.

H. M. THOMAS.

BROOKLIN, C. W., April 24, 1867.

For the American Bee Journal and Gazette.

Smoke for Bees.

MR. EDITOR: I wish to call your attention to the subject of taming bees with smoke. I use rotten wood, such as you can break to pieces with your fingers. That called dry rot is best. With a little care it will burn without a blaze. To use it I take a common fire shovel with a little fire on it, and lay some of the rotten wood on it, and then blow the smoke into the entrance of the hive. It will soon quiet the bees, but will not stupefy them. If the first trial does not quiet them, blow more smoke into the entrance of the hive. I am opposed to using tobacco, and puff ball, and old rags; it is too sickening and disgusting. But the rotten wood has no bad effects and costs nothing, and the supply is inexhaustible.

M. S.

NEW SALEM, OHIO, April 30th, 1867.

[For the Bee Journal and Gazette.]

Purity of Italian Bees.

Reading an article on this subject in No. 1 of the second volume of the Bee Journal, page 17, I came to the conclusion that the Italian queens I ordered and purchased from Mr. L. L. Langstroth were what Mr. Kleine terms bastardized, because none of them raised young queens perfectly equal in color to their mother. And who would not have come to the same conclusion? I was still more convinced of the correctness of my opinion, when I read an article of Mrs E. S. Tupper, in the Chicago *Prairie Farmer*, in which she says, "*I cannot consider an Italian queen pure whose royal daughters are not duplicates of herself.*" Of course this led me to the opinion that Mr. Kleine's and Mrs. Tupper's queens were of this description. Having occasion to go to Chicago on other business, I concluded to visit Mrs. Tupper, but on arriving at her premises, found that she had gone to the State Fair at Burlington. On examining some of her stocks, I soon became satisfied that her Italian bees did not differ from those I had raised from the Langstroth queens. Meeting this learned and interesting lady afterwards at Burlington, in a short conversation about Italian queens she made the remark that we must be satisfied if we get a majority of handsome young queens from a pure mother. Hence I concluded I could not get what I wanted, a queen absolutely pure according to Mr. Kleine's description. Now I cannot conceive why Mr. Kleine wrote the interesting letter already referred to, nor why Mrs. Tupper defines the purity of Italian queens as she does, when both of them should have known that they had no such queens themselves, and could not procure any such anywhere, not even in Italy. Nor can I explain this satisfactorily to my mind, even after reading Mr. Kleine's letter on color as a test of purity in Italian bees, published in the Bee Journal, vol. 2, No. 6, page 119. Who can reconcile Mr. Kleine's letters, or Mrs. Tupper's definitions? Undoubtedly Mr. Kleine would stand a great deal higher with the breeders of Italian bees had he never written his first published letter, as far as queens and drones are concerned. And Mrs. Tupper would probably have saved herself many explanations and dissatisfactions, if among the young queens obtained from her there be such "whose royal daughters are not duplicates of themselves."

I obtained and still have three queens of Mr. Langstroth, and have raised about six hundred fertile young queens myself. Yet none of all of them was or is so pure that their young queens did not greatly vary in color, while all their workers are purely marked with three distinct stripes. From an almost black Italian queen, which I tested for breeding, I raised three splendid yellow ones, equal to any in my apiary.

ADAM GRIMM.

JEFFERSON, WIS., March, 1867.

[☞ It is now conceded that proof of the pure fertilization of an Italian queen, and consequently of her absolute purity, is to be looked for only in the marking and deportment of her *worker* progeny.]

Bees Fertilizing Flowers.

I am tempted to give one more instance showing how plants and animals, most remote in the scale of nature, are bound together by a web of complex relations. The exotic Lobelia fulgens, in this part of England, is never visita by insects, and consequently from its peculiar structure, can never set a seed. Many of our orchidaceous plants absolutely require the visits of moths to remove their pollen masses and thus to fertilize them. I find from experiments that humble-bees are almost indispensable to the fertilization of the hearts-ease (*viola tricolor*), for other bees do not visit this flowers. I have also found that the visits of bees are necessary for the fertilization of some kinds of clover. Thus, for instance, twenty heads of Dutch clover (*trifolium repens*) yielded 2,290 seeds; twenty other heads protected from bees produced not one. Again, a hundred heads of red clover (*trifolium pretense*) produced 2,700 seeds, but the same number of protected heads produced not a single seed. Humble-bees alone visit red clover, as other bees cannot reach the nectar. It has been suggested that moths may serve to fertilize the clovers; but I doubt this in the case of the red clover, from their weight being apparently not sufficient to depress the wing-petals. Hence we may infer as highly probable, that if the whole genus of humble-bees became extinct or very rare in England, the hearts-ease and red clover would become very rare or wholly disappear. The number of humble-bees in any district depends in a great degree on the number of field-mice, which destroy their combs and nests; and Mr. H. Newman, who has long attended to the habits of humble-bees, believes that "more than two-thirds of them are thus destroyed all over England." Now the number of mice is largely dependent, as every one knows, on the number of cats; and Mr. Newman says, "Near villages and small towns I have found the nests of humble-bees more numerous than elsewhere, which I attribute to the number of cats which destroy the mice." Hence it is quite credible that the presence of feline animals in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district.

DARWIN.

Bees in South Africa.

Livingstone says: Bee-culture is prosecuted in Londa, and hives are found there placed on trees in the desert forests. We frequently met with wagons freighted among other commodities with lumps of wax weighing from eighty to a hundred pounds; and it was offered to us for sale in nearly every village. But here (in Zambesi, south latitude 16°) we did not see a single hive, though bees were found everywhere in the hollow Mopane trees. In many parts of the Batoka country bees are abundant, and the tribute due to Skeletu is usually paid in large vessels of honey. We saw a small quantity of wax also in Kilimane, gathered by the natives of that district.

Missionary Travels, 1857.

[From the Bienenzeitung]

Italianizing Stocks.

Whoever keeps and cultivates bees, does so either for pleasure or profit, or for both, and cannot in any way so certainly attain his object as by the introduction of the Italian bee in his apiary. It will be a gratification to him to be able to verify experimentally the various facts in the natural history and habits of the bee by which the mystery in which the subject was for ages involved has been elucidated. An assured knowledge of these facts will also render the intelligent application of them to the purpose he has in view all the more easy and make success more certain, as he will be able to substitute principles for mere empirical processes. He becomes emphatically master of the situation, has his forces completely under control, and can direct their energies as an enlightened judgment dictates. For the speedy acquisition of this knowledge, the Italian bees are of the utmost importance, and thus possess a specific scientific value, apart from their superiority as honey-gatherers which renders them so desirable to those who aim to secure pecuniary profit also. Thus, in either view the Italianizing of an apiary is a matter of special interest. How is it to be accomplished?

The speediest mode certainly is to procure as many Italian queens as we have common stocks, and substitute these for those of the common race. But this is an expensive mode, and not always feasible even where operations may be conducted without much regard to cost.

The more common practice is to purchase one or more Italian queens, rear young queens from these in nuclei hives, and gradually build up the latter by introducing brood from common stocks till they have become sufficiently strong to maintain themselves as independent colonies. If this be undertaken during the same season when the Italian queen was procured, all or nearly all of the young queens thus reared will be impurely fertilized, from the want of pure drones and the superabundance of common drones in the apiary and neighborhood. These bastardized queens have subsequently to be superseded by others purely fertilized, which can rarely be effected till the following year, especially if the bee-keeper is still a novice; and I therefore preferred modifying the process, and hastening more slowly.

I procured and introduced an Italian queen in an ordinary stock of common bees, and then took care to get it in good wintering condition by inserting occasionally combs containing brood, pollen, and honey. The following spring, as soon as it contained plenty of worker brood and some drones had made their appearance, I formed a small artificial colony by means of the queen—proceeding thus: I part the hive thoroughly, examining each comb as I take it out and looking for the queen. Finding her, I set the comb on which she is aside temporarily. I then select a comb composed in the main or altogether of worker brood nearly mature, place the queen among the bees adhering to it, and set it in a nucleus hive. To this I add a comb containing honey and pollen, setting it at one side of the brood comb, and placing an empty comb on the other. I now return the remaining combs to the parent hive in order due, after running a portion of the bees from each into the nucleus hive, then close the hive and replace it on its original stand. I supply the nucleus with water in a feeding trough, and set it in any convenient place in the apiary. Though crowded with bees at first, most of the old ones will leave and rejoin the parent stock, but the young ones will remain in sufficient numbers to protect the maturing brood, from which they will be rapidly re-enforced, and their hive contains all the requisites for the sustenance of the larvæ, which will, in a few days, be hatched from the eggs laid by the queen. By introducing additional worker brood from other stocks this artificial colony may very soon be made strong enough to bear dividing in the same manner, and the queen made to contribute to anew the multiplication of stock.

The bees of the parent hive will soon become aware of their queenless state, and proclaim it by their restlessness. But conscious of possessing the means of supplying their loss, they will soon become reconciled and proceed to apply the remedy by erecting queen cells over a select number of worker larvæ. On the ninth day after forming the nucleus I open the parent hive again and apportion among the combs the queen cells then found, inserting one of these in each of the combs, if a sufficient number have been started. If I have more queen cells than can thus be disposed of, I take as many combs from other hives as I can use, shake off the adhering bees, insert a queen cell in each, and place them in the queenless hive. In a few hours all these cells will be properly fastened by the bees, and the business of multiplying stock may now be resumed. For this purpose I have in readiness as many nucleus hives, less one, as I have queen cells available These little hives are of various sizes; some fitted to receive one, some two, and some three combs. I prefer those suited for two combs. Into each of these nuclei hives I place a comb containing a queen cell, with all the adhering bees, and add to it a comb at least half filled with honey. One brood comb with a queen cell and one comb with honey will remain in the parent hive, into which a dividing board is to be set so as to contract the space to the wants of the now reduced colony. This operation must be performed very carefully, so that the entire population of the parent hive may be equally apportioned among the nuclei. These should now be closed, and carried to a new location, a mile or two distant from the old stand, and remain there till the young queens have been hatched and fertilized. They may then be brought back and built up by adding worker brood from other stocks in such quantity from time to time as can be well covered and protected by the recipients of the bounty.

A second process which I sometimes employ, is as follows: I remove from a stock of common or hybrid bees, one or more combs containing sealed brood, with all the adhering bees, place them in a nucleus hive and carry this to a distant locality. Next day after the bees have become conscious of their queenless and helpless condition—for there must be none but sealed

brood in the transferred combs—I insert a piece of comb containing eggs and larvæ taken from a pure Italian stock. The bees will immediately start one, probably several, queen cells. I examine the nucleus again on the ninth day, and if I find more than one queen cell I provide as many nucleus hive as are needed, and so divide as in the first case.

For the American Bee Journal.

Burying Bees.

Much has been written about burying bees, and thus preserving them during winter, and numerous experiments have been made, generally without satisfactory results. Probably the trouble arises more from the mode of applying the system than from any inherent incompatibility. I do not propose here to take part in the controversy, or to pronounce judgment, pro or con, on the particular processes employed by those who have either been successful or have failed in this sort of winter management. My design is solely to submit to the intelligent bee-keeper my personal experience in the matter, showing what I have done and how I did it.

I have kept bees now more than thirty years. Long before I began I had heard of burying bees, and the advantage to be derived from keeping them in undisturbed repose during a variable and inclement season were so obvious as to make the theory at least inviting. But having no opportunity to see how those proceeded who endeavored to put the plan in practice, I made no attempt myself to do so; though, like most beginners, I had plenty of weak stocks every fall, sure to perish in the winter without some extraordinary care for their protection and preservation. Bees were scarce in my neighborhood—they could not be bought, while honey was always procurable at some price. This induced me to hive all my swarms, even the latest and weakest; for I was anxious to enlarge my apiary as quickly as possible, and trusted to fall feeding to carry my liliputian colonies over the winter. Of course I generally found myself in the spring like other novices to whom hope had "told her flattering tale," in possession of a nice assortment of dead workers and queens. Still, success in a few instances, like luck in a lottery, kept luring me on, and reiterated losses could not speedily wean me from the infatuation of continuing or renewing my unprofitable practice.

A few years after a weak swarm issued from one of my stocks late in August. I hived it in a straw eke six inches high and twelve inches in diameter. It immediately clustered against the top, forming a small ball scarcely larger than my fist. But it was very active, carrying in honey and pollen from a field of esparcette near by, then in bloom. Industrious as it was, it could obviously not secure a supply of stores sufficient for the winter, for the population was too small to enable it to labor to advantage while pasturage was still accessible. I now determined to make my first experiment in burying bees with this small colony, else inevitably doomed.

When external supplies began to fail, I weighed off three pounds of pure honey, and fed these bees therefrom, giving them small portions every evening until they ceased carrying it in—when I found that they had taken up a pound and a quarter in all. Meanwhile I had procured a quantity of clean sand, and dried it thoroughly in an oven. At the end of September I poured some of this to the depth of twelve inches in a corner of my ice-house, set this hive on it gently, and inserted in the entrance a tin tube extending upward like a syphon fifteen inches above the top of the hive—securing this and closing the entrance with a lump of moistened clay. I then set a board, six inches higher than the hive, diagonally across the corner, to inclose and retain the sand, which I now poured in slowly around and on the hive, completely covering it to the depth of four inches, leaving only the tin tube clear to supply ventilation and air. I let it remain thus undisturbed fully six months. Towards the end of March, when the external temperature induced the bees in my apiary to fly, I exhumed the buried hive, and was gratified to find the bees still living. I fed them regularly every other evening liberally for about two weeks, when, being called from home, I had to leave them to their fate. After an absence of four weeks I found them strong and active, having already so filled their hive with new comb that I gave it an eke, and in less than ten days I had to enlarge it by adding another. From this stock thus wintered I received two strong swarms that spring, and gave it also a large super, which it filled with honey.

I have given this account rather for the gratification of those who keep bees for their own enjoyment than for those who take no pleasure in feeding to weak stocks the honey garnered by their populous colonies, or who are indisposed to buy honey for such a purpose. Amateurs are more likely to make it a subject of intelligent reflection, and may be led by it to devise some plan equally feasible and of more general utility. I have myself since frequently wintered populous and well stored colonies in this manner. I have also modified the plan so as to adopt it to wintering colonies thus protected on their summer stands, enabling me to permit the bees to fly when the weather chances to be suitable and guarding them at the same time from the effects of rigorous cold. Bees can thus be kept quiet for an indefinite period in the severest winter without any undue consumption of stores. I may describe my process hereafter.

FURST.

In the Prussian city of Potsdam there are at present forty-nine bee-keepers, who have together five hundred and ninety four hives. An old record, dated in the fifteenth century, says of Potsdam: "the inhabitants of the island support themselves by fishing and bee-culture."

Though bee-culture is not so general in Moldavia as in Poland, yet it is in many localities prosecuted on a very extensive scale. There are some proprietors of large landed estates there who are owners of from six thousand to ten thousand hives.

[From the Bienenzeitung]

A Hostile Demonstration.

At certain times and under peculiar circumstances, conditioned perhaps by the state of the weather or of the quality of the pasturage, bees are much more ill-tempered and irritable than at others. Ordinarily, however, they are peaceable, though an untoward occurrence may quickly excite their anger or even render them furious and ungovernable. An instance of such transcendent and really ferocious passion occurred within my knowledge.

An inhabitant of a neighboring village usually kept his dog chained in a yard, but found it necessary one day to remove him to make room for the passage of a wagon bringing in a supply of turf. Taking him to his garden, he chained him to a plum tree, about fifteen or twenty steps from the stand of the only bee hive there. The dog being thus at an unaccustomed place, was naturally restless, but was soon made more so by the bees, which happened then to be flying in that direction His strugg es were seen and his whining heard, but were disregarded as mere evidences of his efforts to break loose, caused by the presence in the yard of a number of men and horses. But in a short time the dog came rushing among them howling terribly, and discolored so as scarcely to be recognized. He was completely covered by a dense mass of bees, and in his agony had broke the chain, and now came running to his master for refuge and protection. The bees were thus brought into the yard, though their hive was several hundred yards away, and men and horses were instantly assailed by them. It was with difficulty that the latter could be rescued and brought into a secure place, as the enraged insects followed them more than thirty rods from the premises. In their fury the bees then attacked the residents of the neighboring houses; and one living on the south, with houses, trees, and shrubbery intervening, was so stung by them while striving to save his dog, that it was feared he would die Children playing at a distance were stung, and had hastily to be carried to a place of safety; and swollen faces were common all around next day. Several hours passed before the bees withdrew and became pacified. The dog first attacked speedily died from the innumerable stings inflicted on him.

GERASCH.

THE AGENCY OF INSECTS IN FERTILIZING PLANTS —I have made some observations and experiments, says Mr. W. I. Beal, in the *American Naturalist*, on the fertilization of Phœnogamous Plants, showing that in the genera *Kalmia* and other genera also, insects are necessary to carry pollen from flower to flower in order to fertilize the pistils.

I have found also, that of many plants which produce perfect flowers, in some the stamens discharge all the pollen before the stigmas of the same flowers are exposed; while there are others in which the pistil is fertilized before the pollen of the flower is discharged. In these two ways they act as though they were monœcious plants.

[For the American Bee Journal]

Poisonous Honey.

In the AMERICAN BEE JOURNAL, Vol. 2, page 188, two reasons are given why honey creates colic in some persons and not in others. 1st. Honey gathered from poisonous flowers. 2d. The poison proceeding from the sting of the bee.

As to the first reason, it may *occasionally* be the cause, but all are affected who eat such honey and not just certain ones.

Referring to the second reason, I would ask whether the bees always poison their honey? Why does honey *always* produce colic in some persons? Would not a man of fifty or sixty years of age get *some* honey during his life that was *pure* and not poisioned by the sting of the bee? Yet we meet old men that say they *never could eat honey* without it caused them a fit of colic.

I think we must look in some other direction for the cause, and when we direct our attention to the *constitution* of certain individuals we are probably looking in a proper direction. Every one is aware that certain persons have peculiarities about themselves, that render them very susceptible to morbid impressions from causes that in others have no effect wha ever.

Physicians tell us that certain persons are met with who are very suscepible to the action of all mercurial preparations, one or two grains of calomel producing severe salivation, whilst there are others that can take twenty or thirty grains without being salivated in the least. Some persons cannot eat cucumbers, nor even be at the table where they are served. Certain persons are affected with nettle-rash (Urticaria) whenever they eat pork. Some persons are seized with a fit of asthma the moment a particle of the root called ipecacuanha is brought in contact with their bodies. And to this peculiarity existing in some persons we must attribute the cause of honey creating colic in some persons and not in others.

W. H P.

BUENA VISTA, OHIO.

Bees in Brandenburg.

In 1806, Christian Pehlemann, an invalid, resident in the village of Odenburg, in the Prussian province of Brandenburg, loaned the then hard pressed King of Prussia, four hundred rix-dollars, the surplus profits of an apiary of thirty hives of bees by whose labors and products he supported himself. In 1812, the King repaid the loan with interest, and presented to the patriotic lender a gold medal having a hive and a cluster of busy bees embossed thereon.

In 695 villages of this province there are 3212 bee keepers and 32,814 hives of bees. The average annual yield of these hives, according to the statement of the bee keepers, is four dollars each, making an aggregate of $131,256 At the same rate the entire product of honey in the province would exceed half a million of dollars. The soil is sandy, and the country may on the whole be considered as rather a poor honey district.

Honey in Ancient Times.

The Hebrews, the Greeks and the Romans appear to have used honey exclusively for the purposes for which we now employ sugar. A Hebrew writer who lived about the time of the rebuilding of the temple of Jerusalem, enumerates honey among the necessaries of life. Horace, Pliny and Martial, state that the epicures of Rome mixed honey with their wines, ragouts and soups. Honey is not mentioned by them as a sweetening; though Galen, Pliny, and a few other authors allude to *saccanon* as a white chrystallized gum obtained from an Indian reed This was in reality sugar. It was used only as a medicine, and was brought to Rome in pieces of the size of a nut.

Sugar did not become generally known till the Arabians carried their victorious arms into the western regions, and introduced it in the various countries they subjected to their sway. The first writers by whom sugar, as such, is mentioned, lived in the time of the crusades. Albert of Aix states that the soldiery when near Tripoli, in Syria, pulled up the sweet stalks of a reed grown there abundantly in the fields, and called *zucra*. Its wholesome juice refreshed them, and was so grateful to their taste that they were incessantly sucking it. This valuable plant was diligently cultivated every year. When ripe for harvest, the natives crushed the reeds in a mortar, pressed out the juice, and preserved it in vessels till it became thick and granulated, and resembled snow or salt in its whiteness.

In the year 1306, when *Sanudo* compiled his Mysteries of the Crusaders, the sugar cane was not yet cultivated in Sicily, though it was then already grown extensively in the Morea, in Cyprus, and Rhodes. A century later it had become so common in the island of Sicily, that the infant Don Henry of Portugal readily obtained there a supply of plants for its introduction in Madeira. From here and from the Canaries it was carried to America, where it has been so extensively cultivated that the European plantations were speedily abandoned, and America now supplies with sugar not only nearly all Europe, but a large portion of Asia also. The sugar cane was first brought to the western hemisphere by the Spaniards.

Bees in Poland.

No country in Europe produces so much honey as Poland. For many years bee-culture has there been one of the chief branches of economical industry. You will there find many humble cottages with a small spot of ground adjoining on which from fifty to sixty hives are placed; and there are numerous landed proprietors who have thousands of hives on their estates. Many cultivators there realize an annual product of two thousand barrels of honey, weighing from 400 to 500 pounds each. The profits of bee-culture pay all their taxes, defray all their household expenses, and enable them to make ample provision for their children. Large quantities of honey are annually exported, and the confectioners of neighboring countries are in large measure dependent on Poland for their needed supplies.

[For the American Naturalist.]

The Wild Bee Tribe.

It is well known that the Queen Humble Bee winters under the moss or in her old nest. During the present month (May) her rovings seem to have a more definite object, and she seeks some deserted mouse nest or hollow in a tree or stump, and there stows away her pellets of pollen containing two or three eggs apiece, which late in the summer are to form the nucleus of a well-appointed colony.

The carpenter bees, Ceratina and Xylocopa, the latter of which is found in abundance south of New England, is busy in refitting and tunnelling out the hollows of the grape: while the Ceratina hollows out the stem of the elder or blackberry. This little upholsterer bee carpets her honey-tight apartment, storing it with food for her young, and later in the season, in June, several of these cartridge-like cells, whose silken walls resemble the finest and most delicate parchment, may be found in the hollow stems of these plants. The Mason Bee (*Osmia*) places her nest in a more exposed site, building her earthen cells of pellets of moistened mud, either situated under a stone or in some more sheltered place, for instance in a deserted oak-gall, ranging half a dozen of them side by side along the vault of this strange domicile. Meanwhile their more lowly relatives, the Andrena and Halictus bees, are engaged in tunnelling the side of some sunny bank or path, running long galleries under ground, sometimes for a foot or more, at the farthest end of which are to be found in summer, little earthen urn-like cells, in which the grubs live upon the pollen stored up for them in little balls of the size of a pea.

A. S. P.

[For the American Bee Journal]

Wintering Bees.

I send a statement showing how bees have wintered at St. Charles, Kane county, Illinois.

One hundred and thirty-five stocks kept in a cellar, with the slats removed off the holes in the honey boards and with the summer entrance open; none were lost.

One hundred and thirty-five kept in a cellar ceiled inside of the stone walls and floor laid: none lost.

One hundred and thirty kept in a brick house built with double walls, the space filled with sawdust, cement floors; none lost.

Twelve stocks kept in a cellar, with water frozen in the room for twenty days; none lost.

Thirty seven kept in a cellar with vegetables in the same room; none lost.

The bees hatched more young than they lost of old ones. They were housed in the 20th of November and set out on the first of April.

They worked three days on rye flour, then on the wild willow, soft maple, and some other flowers. On the 10th on poplar and cotton wood; and now on gooseberries, currants, golden willow, and other wild flowers.

From the 1st to the 10th of May the bees stored honey from each set of flowers named The usual proportion of stocks were lost of those tried to be wintered on their summer stands.

J. M. Marwin.

For the American Bee Journal.

Head off the Moth-Worms.

A friend writes me that the moth-worms trouble him exceedingly, and have made out to destroy a part of his apiary, and desires to know how to "*head them off*" the present season.

1st. *Get your bees into frame hives.* Determine at once what is the best *shape* of hive for your *latitude*, and use that shape only. When your bees are in frame hives, the combs, bees, brood, moth-worms, and all, are under your control. Do not forget to acquaint yourself thoroughly with the system of taming bees as now practiced by our best bee-keepers.

2d. *Use no moth-traps*, and have the hives so well made that the moth-worms can find no hiding places on the outside of them.

3d *Keep your hives always supplied with young queens.* Suffer none to live more than three years, or after they show signs of decreasing fertility.

4th. *Handle the combs often*, and when doing so never suffer a moth-worm to pass unnoticed, but destroy it at once. The heel of your boot, rightly used, will generally stop its breath. Make these examinations often in the spring months, as a few worms destroyed then are equivalent to many hundred later in the season.

5th. *Depend entirely on artificial swarming*, in other words, make your bees swarm. Regulate the number of swarms according to your desire, (but do not desire too many,) and suffer no family to become so reduced in bees that they cannot protect the combs. Should any family, however, have more combs than the bees can cover or protect, take the excess away and put them into a dark, cool room, and return them when the colony has recuperated. It is better, however, to exchange these combs with some strong family for those of maturing brood.

These directions, if put in practice, will keep every hive of bees in full strength, and you will have very little trouble with moth-worms. Try them. M. M. BALDRIDGE.

ST. CHARLES, KANE CO., ILL.

Transferring.

EDITOR BEE JOURNAL:—A few days ago I succeeded in transferring a strong stock from an old box hive in a simpler and quicker way than the one usually recommended. It was as follows:—

In the middle of the day I removed the old hive a few feet backwards; put the new one in its place; cut the combs close to the sides of the hive with a thin piece of steel-plate; pried off one side and cut the bottom free the same way; and in less than ten minutes had a frame of brood comb in the new hive. I then brushed the bees in front of the new hive as fast as I wished to use the combs, which were immediately placed in the new hive as fast as I could get them into the frames. I was careful to see that the queen entered, and after that the bees worked right along without any interruption.

I used a cloth to spread over the old hive to keep out robbers while I was putting the combs into the frames, and another to spread over my transferring board when not using it. By having all implements needed ready, splints with tacks driven through the ends at the right place, &c., it was all finished in less than an hour, and scarcely a drop of honey spilled or a bee injured.

As a proof of their prosperity, the second day after, they had built a piece of new comb more than six inches square, which is more than all the pieces that were wasted in transferring from the old hive. The combs were fortunately nearly straight and the bees were very busy on the fruit blossoms at the time. A. J. ROOT.

MEDINA, OHIO.

For the American Bee Journal and Gazette.

The Experience of a Novice in Bee-Keeping.

NUMBER 4.

After introducing so valuable a queen, I began to think it would be advisable to feed my swarm up to a point beyond the probability of starving during the winter, and accordingly purchased enough coffee sugar to make twenty pounds of syrup, which I fed to them in the top of the hive as fast as they would carry it down; but it being late in the season and the weather rather cool, they did not take it down very fast.

A friend interested in bees, called on me just as I was feeding them the last of it, and he expressed a desire to see "Her Majesty." I opened the hive to find her and was very agreeably surprised to find a multitude of little "yellow chaps" just emerging from their cells. At first I thought it could not be twenty one days, but on counting up I found it was just twenty-one days, almost to the hour, on which she was released from the cage.

I was furthermore *dis*agreeably surprised to have my bee friend tell me that they had not honey enough to last them two weeks. Where was the twenty pounds I had fed them gone to?

I was at a great loss then to tell, but now suppose that it had entered largely into the composition of the aforesaid little "yellow chaps" that I was so much delighted with; so much does it require for raising brood.

I continued feeding them whenever they would take it, as I knew of no other way; and some warm weather coming in eight or ten days after, I had the satisfaction of beholding a golden shower of the little fellows playing in front of the hive, sporting in the sunshine, and making a display more beautiful to me than any fireworks, and their happy joyous hum was the sweetest music.

This was all very well for a day or to, but my unseasonable feeding produced unseasonable flying; and the hive still being in an upper story, my young Italians would fall to the ground, and were unable to get back again. I now became convinced that an elevated situation was *not* the place for bees, all that had been said about their state of nature in high trees, &c., &c., to the contrary.

Accordingly I moved the hive down on the lower floor, but then a part of them went up to their old locality and were lost, notwithstanding as much as a week or ten days of cold weather had intervened.

Well, by the middle of December my hive contained very few bees and almost no honey at all. What was to be done?

I brought them into the house with a cloth over the front, and got some real honey and fed them well; but there were so few bees that I was afraid to risk them; so I tried what I considered a bold experiment. I found where I could get some heavy Langstroth hives; brought them home; took a frame from each of four of them, bees, honey and all—looking them over carefully to avoid getting their queens; put the four frames and bees into a box; shook them all up so that each individual bee did not know whether he was himself or somebody else. I then shook the bees off from the frame, placed the frame in my Italian hive, and poured the bees on a newspaper in front of the hive; (by the way. I think a newspaper or two much better than a cloth to swarm bees, as you can by taking hold of the corner, shake the bees up near the hive with very little trouble, as they cannot stick to it at all;) carefully looking them over to see that I had no black queens.

All seemed well. The bees went in as thankfully as if they had always lived there, and filled the hive up so as to make a nice swarm. But on going to look at them in the evening, I found a very long bee on the entrance board, dead. With a heavy heart I carried her in, and while mourning over my departed queen, as I supposed, behold she began to move, and then to crawl, and, on being fed, became quite lively. What to do with her now was the question. I finally put her into a cage, set her over one of the holes in the honey board, and left her until morning, although the bees seemed to pay very little attention, to her, as I thought, for a queen.

In the morning she was dead again, and this time would not come to life for warming, honey, or anything of the kind; and to make sure that she was the queen, I sent her to Mr. Langstroth, and waited nervously for a reply, clinging to the hope that I might be mistaken, and supposing that he probably could tell a queen when he saw one.

In a few days a reply came, stating that he was happy to inform me that the bee enclosed was nothing but a WORKER BEE, with its body considerably distended with dysentery.

As may be imagined, this was welcome news, and so far relieved my mind that I concluded to rest in peace and let my bees do the same until spring—which they did, and came out all right, with one whole frame of sealed honey untouched.

Why did the twenty-five or thirty pounds of syrup fed them do so little good in comparison with the frames of sealed honey given them? Was it raising the brood in the fall that took so much? Does honey go so much further than thick sugar syrup? Or, was it from the fact that the honey was sealed in the frames and just as they required it?

I suspect that all three had something to do with it; but would be glad of further light on the subject.

How shall we feed them in the fall to prevent them raising brood if it is not advisable?

In my next I will try and give the result of my attempts at queen-raising in the summer of 1866.

A. J. ROOT.

MEDINA, OHIO.

An Attack by Bees.

THE MILITARY ROUTED IN ALGERIA.

A company of French light infantry sent out to make a reconnoissance in Kabylia, halted at noon for rest and refreshment in a village which had been deserted by its inhabitants on their approach. The soldiers were thus able to explore the village in all directions and search the houses entirely unmolested, but found that the fugitive population had carried off all their valuables except about thirty hives of bees under shelter of a dense cactus hedge. These, being well stored with honey, were at once appropriated amid exulting shouts by the soldiery, who immediately kindled a fire and expelled the bees *en masse* with smoke. After a portion of the liquid sweets had been consumed, the company was reformed and resumed its march, carrying with them the hives on the points of their bayonets But the maltreated bees, thus deprived of their stores, had by this time recovered from their alarm and stupefaction and were on hand by myriads to avenge their wrongs. Gathering in a cloud above the advancing column, they suddenly descended and attacked it furiously in front and rear and on every side. The soldiers unprepared for such an onset, threw down the hives, dropped their arms, and danced around, crying, leaping and beating the air in their vain attempts to strike down their enraged assailants. But all their efforts were unavailing; even the fume of burning gunpowder was of no avail; though dozens of cartridge boxes were emptied for a supply, it only rendered confusion worse confounded. While thus disorganized and demoralized, the fugutive Berbers, seizing the advantage, rushed boldly to attack them, and speedily effected their utter discomfiture---the French being driven off, leaving about one-third of their force dead on the scene.

Incarnat clover (*trifolium incarnatum*) is an annual, the blossoms of which yield supplies of excellent honey which is eagerly gathered by bees. When sown in spring on stubble land which was plowed in autumn, it comes into blossom about the last of July or first of August, yielding plenty of pasturage for bees, and producing on good ground a large crop of hay. Sow about half bushel of seed on an acre. It may be sown with spring barley, but will then come into flower somewhat later. If sown in autumn, it should not be done later than about the beginning of September. It will then blossom in May, and can be mown for an early crop of hay. It succeeds well on loamy, clayey and sandy soils; and is best adapted for mild climates.

[From the Canada Farmer.]

Medium Hives vs. Large Hives, for the Production of Surplus Honey.

To the Editor of the Canada Farmer:

SIR:—It is thought by some that the object of bee-keeping should determine the size of the hive; that is, if the object be to increase swarms, small hives should be used, but if to obtain surplus honey large hives should be used. This opinion is supported by certain German apiarians, as may be seen from a quotation from the AMERICAN BEE JOURNAL, made by "Briar" in the *Canada Farmer*, of March 15. German authority upon many points in apiarian science is of the highest standard, yet still with them, as a people, there is a great amount of superstition, of which it is hard to rid them. It is owing to this, I fancy, that some of them still advocate large hives for the production of surplus honey. American bee-keepers have long since found that it is strong *stocks*—large swarms, and not large hives, that produce large amounts of surplus honey. It is a mistaken notion that a large barn of a hive will contain a correspondingly large number of bees. If such hives were examined after they became filled with combs, the breeding space would be found no larger than in hives of much smaller dimensions. But it may appear to some that there would be more room for the bees, therefore they would not swarm, but increase in numbers until the colony becomes very numerous. But it should be understood that *room* to a bee is a place to work in—a place to store honey, which is no more to be found in a large hive, once filled, than in a medium one; hence in either case they will swarm unless more space is given to them where they can store honey. It is also found that swarms cast from large hives are generally no larger than those cast from a medium hive, which is good evidence that the colony is no larger. What advantage, then, have the same number of bees in a large hive in producing surplus honey? They may have more honey in the hive, but such honey is not marketable; and while they were placing it in the body of the hive, they might have put it in boxes suitable for market, had the hive been smaller. For illustration let us suppose that A and B are neighbors, and both commence bee-keeping at the same time this coming spring, their object being the production of honey. A buys a swarm and puts it into a medium sized hive, containing say 2,000 inches: B buys a swarm and puts it into a large hive, containing 5,000 inches. In neither hive is the queen limited for breeding space. Now what will be the results in two or more years, allowing that their bees do well? In ten or fifteen days after the swarms are put into the hive, A's swarm has filled the body of the hive, and commenced to fill a box which will hold 20 lbs. B's swarm has not yet filled the body of the hive half full; however, like A's swarm, it has built sufficient comb for breeding purposes, and commenced to store surplus honey in the body of the hive, where they have room for storing 100 lbs. In ten days A's swarm has filled the box, and it is removed, and a second box put on, which they at once commence to fill. B's swarm, of course, has stored a like amount, 20 lbs., but it is in the body of the hive; ten days more, and the honey harvest is over. A's swarm has filled the second box, which is removed; making altogether 40 lbs. surplus honey, which at twenty-five cents amounts to $10 00 B's swarm has deposited the same, but as it is necessary that the body of the hive be filled, it is not available. At the end of the first year, A has realized 40 lbs. of honey or $10. B has realized nothing. The stocks are now put into winter quarters under the following conditions. A's stock has a store of honey for winter use, say 40 lbs. B's stock has a like amount, and 40 lbs. extra, not required, and empty space in the hive sufficient to hold 60 lbs. more. During the winter 20 lbs. each is consumed. Spring opens with a good honey harvest, and the result will be as follows: A's stock will fill a box of 20 lbs. and cast a swarm which will fill another hive, and make 40 lbs more of surplus honey. B's stock will fill the hive, but having sufficient room to work, will not swarm. At the end of the second year A will have received 100 lbs. surplus honey, worth $25, and will have two stocks of bees. B will have but one stock of bees, and no surplus honey. True, his hive would contain about 100 lbs. of honey, which if in a movable comb hive might be removed, but it would be unfit for market. It may, however, be supposed by some that as B's stock has not swarmed it must contain a very large quantity of bees, and having an abundance of honey in the hive, will be prepared the third year to produce more honey, by far, than both of A's stocks. Such, however, is not the case. If the stocks be examined in the spring of the third year, it will be found that B's large hive will contain but few if any more bees than either of A's hives. The reason is this: a queen cannot raise her colony above a certain number, varying from sixty to eighty thousand, according to the prolificness of the queen. But allowing that B's stock is somewhat larger, and produces 25 lbs. of honey the third year, and casts a swarm which produces 40 lbs. of honey, A's stock will each produce 20 lbs. and cast a swarm, which swarms will produce 40 lbs each, making the results of the third year stand thus: A 120 lbs. of honey and two swarms. B 60 lbs. of honey and one swarm. The results for the three years would be, that A receives 220 lbs. of surplus honey, worth $55, and three swarms of bees; B receives 60 lbs. of honey, worth $15, and one swarm of bees; making the profits of a medium hive over a large one in three years amount to 160 lbs. of honey or $40, and two swarms of bees. If any person doubts the correctness of the above calculation, let him try the experiment and he will be convinced of its truthfulness.

J. H. THOMAS.

For the American Bee Journal and Gazette.

A String of Questions—No. 2.

In No. 11, I find answers to my questions in No. 10, by two writers. I can assure the writers that I am much pleased with their answers, even though they do not exactly coincide with my views. The main object of these in-

quiries is to awaken thought, and to call out a variety of responses from practical bee-keepers. I hope, therefore, that no one who feels impressed to answer these questions will postpone doing so, thinking that some one else will attend to them, and that his response will not be needed. Send along your views, gentlemen, on such questions as you find in *our* BEE JOURNAL that you feel qualified to answer. If the Editor cannot find room for *all* your responses, he will doubtless make the effort to *condense* them so as to give us the *cream* of what may be written. By this means we shall keep the JOURNAL readers awake, and draw out new ideas on subjects that many old fogies may think are in a threadbare condition. Now for some more questions.

No. 1.—STRAIGHT COMBS.

What is the *best* plan for securing straight combs and of uniform thickness? It is claimed by some writers that elevating the rear end of the Langstroth hive to an angle of about 45° will *always* cause the bees to build the combs straight and within the frames—Is this true in practice?

Why were the guide-frames discarded? Do the bees refuse to stay in hives provided with them? or, are they too expensive? If not, what is the trouble with them?

No. 2.—REMOVING EGGS AND BROOD.

Is there a way to destroy *eggs* and *unsealed* brood and not injure the combs? If so, give us the best plan. The *sealed* brood is easily destroyed by breaking the lids of the cells so as to disturb the contents. But it is sometimes necessary or advantageous to remove the eggs and unsealed brood from native colonies to give place for an Italian progeny. We often wish particularly to destroy the native drone eggs and drone-larvæ when raising Italian queens.

No. 3.—DIVIDING BEES.

Who can give a plan for dividing bees that all bee-keepers can practice? We want some plan that will not fail in the hands of the novice. It should be such a plan as will be easily understood by any one of ordinary intelligence, and will not compel a search for the *queen*.

No. 4.—RAISING QUEENS.

Some bee-keepers use nuclei for raising queens, but others prefer full hives. Now which is the better plan? Is there a way to cause bees to raise a larger number of queens than they would by simply removing the queen?

No. 5.—BEE PASTURAGE.

Why has not some one answered questions No. 1, on page 165 of the JOURNAL? Cannot the question be answered satisfactorily? It seems as though somebody ought to be able to answer it, for it is one of vital importance to every one interested in bee cultivation.

QUERIST.

For the American Bee Journal.

Stir up the Bees.

With me it is a rule of practice to handle bees often, as often as I have time to do so. The oftener bees are stirred up by proper handling the better they will labor. They will breed faster, gather more honey, and lay up larger stores of surplus. At least this has been my experience. Nearly all bee writers say that bees should not be disturbed when working in *boxes;* that if then disturbed they will refuse to work in them. This is an assertion that needs *proof.*

The best returns I have had from bees have been from those that have been torn in pieces, as it were, and then "put to rights" not less than twenty-five times in the course of six weeks! These frequent manipulations were necessary to show visitors the workings of my little favorites, and the value of frame hives. For the past eight years it has been my custom to set apart one or more hives for visiting committees—not wishing to disturb the main apiary; and these families have invariably given me better returns, in both swarms and honey, than those not thus disturbed.

Some of our popular writers advise us not to disturb bees unless it is absolutely necessary. It would be better to advise us to handle them often, but to do so properly. Very few bee-keepers handle their bees properly, but it is in their power to do so. A family of bees operated upon properly will not be irascible after the operation, but will remain in good humor during the season, even though manipulated with twenty-five or fifty times.

CAUTION.—Unless necessity demands it avoid disturbing bees when the consumption of honey and an increase of brood are not desirable. I handle my bees but very little after the honey season closes. M. M. BALDRIDGE.

ST. CHARLES, ILLINOIS.

For the American Bee Journal.

How to Multiply Bees.

Some bee-keepers are afraid to disturb their bees, thinking the bees will get discouraged at the interference of man.

I have managed a box hive, with glass set in the four sides of it, so as to make the bees breed fast and store a large amount of box honey, without discouragement by disturbing them. The four side doors covering the glass were thrown open, and rapping lightly on the glass late in the day, caused the bees to fill their sacs, and store the honey in the boxes that were on top covers, and not disturbed. The bees would carry all the honey in sight up above, and filled the cells with young bees in the hive below. Consequently more bees were hatched and more honey stored. Box hives can be raised to let in light, and blow smoke in the bottom and upon the hive at the same time will have the same effect.

They should be disturbed or handled at any time you want more brood raised. They should not be disturbed or handled when there is likely to be a scarcity of forage after as you increase the consumers.

All stocks that have a large quantity of honey in the spring should be handled often, even to the taking out the combs and cutting off the caps of honey cells. But the case is different in the latter part of the season. Then you want no increase of consumers. By handling the combs often the bees will retain their drones if

THE AMERICAN BEE JOURNAL AND GAZETTE.

WASHINGTON, JUNE, 1867.

☞ The American Bee Journal and Gazette is now published monthly, in the City of Washington, (D. C.,) at $2 per annum. All communications should be addressed to the Editor, at that place.

☞ This number closes the second volume of the American Bee Journal. Though the support it has thus far received has not been sufficient to cover the mere cost of paper and printing, the subscription list has been steadily increasing from the start. We shall continue the publication another year, believing that the growing interest manifested in it will soon place it on a paying basis. May we ask its friends to present it to the favorable notice of bee-keepers in their respective neighborhoods, and thus contribute to enlarge its circulation and extend the sphere of its usefulness? There are several such periodicals in Germany, one of which, issued semi-monthly, is now in its twenty-third year. The French Bee Journal is now in its eleventh year. It is true there is no similar publication in England, but may we not hope that one can and will be permanently sustained in the United States!

In the multiplication of stock by the division of colonies, it is necessary that the operator should understand *the principle* on which success depends, and be governed thereby. Without this he must ever remain a mere empiric, gratified when he attains his object, but unable to render a valid reason for the result, whether it eventuates in success or failure. It may be in season therefore to elucidate the theory and practice according to which such multiplication is effected; and of special advantage to assume that the work is to be done in the bee-keeper's own apiary—that is, that neither division of the colony operated on is to be removed to a new and distant location.

The fundamental principle is this, that the colony selected must be so divided that each division retains and contains whatsoever is indispensable to its continued existence as an independent organism. This is easily accomplished, where common hives are used, by drumming out the queen and a sufficient number of bees to constitute a colony, from a populous stock at the swarming season, when drones have already made their appearance—running these into a new hive, placing this where the mother hive stood, and removing the latter to a new location in the apiary. This is done at the usual swarming season, and a populous stock is selected, because at that season such a stock ordinarily contains eggs, larvæ and sealed brood in abundance. It consequently has within itself the means of speedily replacing its removed queen from the eggs or unsealed larvæ, by starting one or more royal cells; and a fresh worker force is rapidly supplied by the maturing sealed brood issuing in numbers from day to day. It has also ample stores of honey and pollen, and only needs be furnished with a little water daily, if long continued unfavorable weather follows the removal from its original location.

In the case of common hives, a new beginner or a timid operator is sometimes at a loss to know when the colony he proposes dividing is in a proper condition for the operation, and is apt to undertake it too early in the season. The hive must not only be populous, but must contain eggs, unsealed larvæ, and sealed worker brood maturing. It should also contain drones or drone brood nearly mature, unless there be drones or drone brood in some other colony in the apiary, or in its neighborhood. By inverting the hive and blowing in a little smoke from a segar or rotten wood, he will be able to see whether the comb contains worker and drone brood—the former being sealed with covers nearly flat, and the latter with covers considerably protuberant. Finding the requisite condition existing, he may proceeed to drive out a swarm, and if he succeeds in expelling the queen also, he may confidently expect a favorable result.

But it is in dividing movable comb-hives that the novice is most apt to be disappointed. The same principle is to govern here, but the application of it is, to a beginner, not always so easy. He must supply to each division the means of maintaining not only present but permanent independent existence. He must remember that all the worker bees that have once flown out, will continue to return to their accustomed home on their return from subsequent excursions. The hive therefore, which is to contain the division to which a new location is assigned, must receive nearly all the young bees which have left their cells, but have not yet flown out, as only these will return to that hive when they fly out. It should also receive all the combs containing sealed brood nearly mature, and together with the old queen, a due share of the store of honey—though it is not necessary that the apportionment should be precisely equal, as a supply may be afterwards given to the division which appears to be in want. A comb containing pollen should also be given, as some will be needed for the unsealed larvæ and the new colony will not receive any fresh till the young have begun to fly; till then, also, water should be furnished in small quantities.

That division which is to remain in the original hive, on its old stand, and which may be termed the parent stock, must retain the unsealed larvæ, in its various stages, and the remaining stores of honey and pollen. It of course retains nearly all the old bees, since most of those transferred to the new hive will return to it again; and these will furnish the larvæ with the pollen and water which may be needed.

These are the essential principles by which the process of artificial multiplication is to be regulated. The operation is to be undertaken when external circumstances are favorable, and when the requisite conditions exist in the hive. It is obvious that the best time of day for this work is when most of the old bees are absent gathering honey; for then the larger portion of those transferred with the combs, or brushed off into the new hive, are such as have not yet flown out, and which will become attached to the new location. All of these, however, will not be secured, nor is it desirable that they should be, as some nurses are needed for the larvæ remaining in the parent hive.

Bee-Keeping in Poland.

The extent to which bee-keeping is carried in other countries, and the profit resulting from it, may be adduced in support of our opinion that bee culture should occupy a more prominent position than it does in our rural economy. Austria, Hungary, Bohemia, Moravia, and other parts of Germany, are noted for their bee-gardens; but they are all surpassed, both in number and productiveness, by the bee-gardens of Old Poland. In that country, there are cottages, with very small portions of land attached, where fifty hives may be counted: while in some districts, proprietors and farmers may be found who are possessed of from one hundred to ten thousand hives, and in others, there are nobleman who possess from twenty to eighty villages devoted, to a large extent, to the cultivation of the bee for its honey.

The profit derived from honey and wax is very considerable in these countries. The expense incurred is trifling, and the labor still more so, while the amusement afforded is very considerable. In Poland it assists the tenant to pay his rent, helps to defray his domestic expenses, and often enables him to accumulate a dowry for his daughters. In favorable seasons, when the weather is neither too hot nor too cold, too humid nor too dry, fifty old hives, which count a genealogy of centuries, will yield to the cottager from 100 to 150 new swarms, each swarm resembling a little cloud while hovering in the air. Even in the Muscovite provinces, on the Dnieper, which forms the boundary of Old Poland, and which in the winter is usually very severe, although they are obliged to protect their hives from the frost during winter, by placing them in large cellars built for the purpose, the inhabitants cultivate the bee with success.

The method pursued by the bee-masters in Poland is much less expensive, but more profitable; less scientific, perhaps, but more in accordance with the natural habits of the bee, than that pursued in this country The forests of Poland abound in pines, oaks, birches, beeches, and elders; but the timber chiefly used in the construction of hives is fir, cut into narrow deals. These boards should be an inch and a half thick, sound, and thoroughly seasoned, and they should be well joined together by means of wooden pins, so as to form a pyramidal house. The size generally adopted is eight inches at top, and twenty inches at bottom, increasing the diameter at the bottom two inches for every six inches above the indispensable height of three feet and a half. The top of the hive should be covered with a round lid, of the same board as the body of the hive, made so as to fit into the top, having a strong handle attached to it; over this lid is placed an earthenware or clay roof, with a sloping penthouse or ledge to throw off the rain. The hive should be corded round with rope about the thickness of a finger, twisted hard and painted over, so as to render it impervious to rain. This rope should be carried down to the middle of the hive.

An entrance is made in front for the bees by means of a triangular cut, each side of the triangle being an inch in length. A door is not absolutely necessary in a hive of this description, as the opening in the bottom answers every necessary purpose. But most bee-keepers make doors in the hive prepared for winter stock. This door is cut into the back of the hive, just opposite the triangular entrance for the bees, and should be about eighteen inches long and six inches wide, beginning at the middle of the hive, and descending towards the bottom.

In Poland almost every farm has its orchard, sheltered from the north winds by farm buildings, and generally a portion of land is set apart for a bee-garden. The landed proprietors who possess more extensive domains, choose for their bee-gardens low, dry situations, in a valley, at the foot of a hill, or on the borders of a forest:—these woodlands being generally planted so as to afford shelter to the bee-garden. Each garden is also surrounded by a close wooden fence, about six feet high, behind which a dry ditch is dug round the garden, to carry off rain and snow water, it being essential to keep the bee-garden perfectly dry. The ground on which the garden is formed must be kept clear from all sorts of injurious insects, and as bees use much water, a fountain or brook near at hand is essential to their well-doing.

When the hives are to be placed in a garden, the grass should be kept close. In the bee-gardens of Poland the turf is generally removed altogether, and the surface covered over with sand or gravel, well trodden down. When the turf is not altogether removed, it must at least be taken up for two feet round the hive, the space from which the turf has been removed

covered with clean, dry sand, about an inch thick, and well trodden down, before swarming time begins.

It is indispensable, also, that the hive be placed with the entrance towards sunrise. The east side of a hill is the favorite aspect for a bee-garden. In this situation the ground is cut into steps or terraces about five feet wide and three feet high. The hives on the second terrace are placed exactly midway between two placed on the first step, and so on; thus allowing the morning sun to fall upon the entrance of all the hives alike. The terraces thus prepared for the stand of the hive must also be strewed with clean, dry sand, about an inch thick. On this the hive is placed, without supports; but the bottom must be laid round with dry chips, or clean, dry moss, to prevent insects or vermin from creeping into the hive from the bottom.

TREATMENT.

"Some bee-masters of Poland maintain," says M. Chylinski, "that each colony is composed of three orders of bees; the mother or queen-bee, the workers, and drones. Others admit a fourth order, which are called consorts. Each order," say these bee-masters, "differ in external character, and each has prescribed to it a distinct function in the community.

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M. M. BALDRIDGE.

ST. CHARLES, ILL.

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The owner of the house where we put up for the night, returned from the woods, shortly after our arrival, with a considerable quantity of wild honey, some of which he kindly gave us, and we found it to be excellent. It was the product of one of the smaller bees which are so numerous in this part of Brazil. This was the season in which the people go to the woods in search of honey. It is so generally used, that after leaving Duro, a portion was presented us at almost every house where we stopped. These bees mostly belong to the genus *Melipona*, Illig, and I collected a great many which, with some other zoological specimens, were afterwards lost in crossing a river. A list of them, with their native names, and a few observations, may not be uninteresting.

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The first eleven of these honey bees, construct their cells in the hollow trunks of trees, and the others either in similar situations or beneath the ground. It is only the last three kinds which sting, all the others being harmless. The only attempt I ever saw to domesticate any of these bees, was by a Cornish miner, in the gold district, who cut off those portions of the trunks of the trees which contained the nests, and hung them up under the eaves of the house. They seemed to thrive very well; but whenever the honey was wanted, it was necessary to destroy the bees.

Both the Indians and the other inhabitants of the country are very expert in tracing these insects to the trees where they hive. They generally mix the honey, which is very fluid, with farina before they eat it; and of the wax they make a coarse kind of taper, about a yard long, which serves them in lieu of candles, and which the country people bring to the villages for sale. We found these very convenient, and always carried a sufficient stock with us; not unfrequently we were obliged to manufacture them ourselves, from the wax obtained by my own men. A coarse soft kind of cotton yarn for wicks, was always to be purchased at the different fazendas and villages through which we passed.

[These melliponas might perhaps be successfully cultivated in the remote southern sections of the Union, but all attempts to introduce them as far north as Washington have utterly failed. The common bee (*apis mellifica*) is fast superseding them in Brazil.—ED.]

"HOW DOTH THE LITTLE."—Within the almost boundless sphere of natural history, perhaps there is no one subject more interesting and instructive than that within such a small body as that of the bee there should be contained apparatus for converting the "virtuous sweets" which it collects into one kind of nourishment for itself, another for the common brood, another for the royal, glue for its carpentry, wax for its cells, poison for its enemies, honey for its master; with a proboscis as long as the body itself; miscroscopic in its several parts, telescopic in mode of action, with a sting so infinitely sharp that, were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible; and this, too, a hollow tube; that these varied operations and contrivances should be enclosed within half an inch in length and two grains of matter, while in the same small room the large heart of at least thirty distinct instincts is contained, is surely amazing in an extraordinary degree.

WILDMAN puts the query as to why bees can endure the extreme cold of a Russian winter with impunity, while the inferior degree of cold of an English one proves so fatal; and he suggests, as an explanation, that the severe cold *freezes* the bees so that their juices cannot corrupt or putrefy, whereas cold in our climate is only sufficient to *chill* them, leaving their juices liquid and still capable of putrefication. But as it is well known that *frozen* bees do not revive, it is far more likely that the true solution of the matter is to be found in the *greater dryness* of the Russian climate; and that it is to *dampness* that our failures must be ascribed. Let this therefore be carefully guarded against in our preparations for wintering bees.

A HIVE made of straw will last for an indefinate length of time, if protected externally by a thick coat of whitewash, or, what is better, Roman cement. Oil paint should not be applied to a straw hive for this purpose.

IT IS the opinion of many experienced apiarians that a cold winter is not injurious to bees, provided they are sufficiently prepared for withstanding it.

A swarm of bees in May
Is worth a load of hay
A swarm of bees in June
Is worth a silver spoon;
But a swarm in July
Is scarcely worth a fly.

AS THE warm weather approaches do not forget to shade your hives from the sun.

quiries is to awaken thought, and to call out a variety of responses from practical bee-keepers. I hope, therefore, that no one who feels impressed to answer these questions will postpone doing so, thinking that some one else will attend to them, and that his response will not be needed. Send along your views, gentlemen, on such questions as you find in *our* BEE JOURNAL that you feel qualified to answer. If the Editor cannot find room for *all* your responses, he will doubtless make the effort to *condense* them so as to give us the *cream* of what may be written. By this means we shall keep the JOURNAL readers awake, and draw out new ideas on subjects that many old fogies may think are in a threadbare condition. Now for some more questions.

No. 1.—STRAIGHT COMBS.

What is the *best* plan for securing straight combs and of uniform thickness? It is claimed by some writers that elevating the rear end of the Langstroth hive to an angle of about 45° will *always* cause the bees to build the combs straight and within the frames—Is this true in practice?

Why were the guide-frames discarded? Do the bees refuse to stay in hives provided with them? or, are they too expensive? If not, what is the trouble with them?

No. 2.—REMOVING EGGS AND BROOD.

Is there a way to destroy *eggs* and *unsealed* brood and not injure the combs? If so, give us the best plan. The *sealed* brood is easily destroyed by breaking the lids of the cells so as to disturb the contents. But it is sometimes necessary or advantageous to remove the eggs and unsealed brood from native colonies to give place for an Italian progeny. We often wish particularly to destroy the native drone eggs and drone-larvæ when raising Italian queens.

No. 3.—DIVIDING BEES.

Who can give a plan for dividing bees that all bee-keepers can practice? We want some plan that will not fail in the hands of the novice. It should be such a plan as will be easily understood by any one of ordinary intelligence, and will not compel a search for the *queen*.

No. 4.—RAISING QUEENS.

Some bee-keepers use nuclei for raising queens, but others prefer full hives. Now which is the better plan? Is there a way to cause bees to raise a larger number of queens than they would by simply removing the queen?

No. 5.—BEE PASTURAGE.

Why has not some one answered questions No. 1, on page 165 of the JOURNAL? Cannot the question be answered satisfactorily? It seems as though somebody ought to be able to answer it, for it is one of vital importance to every one interested in bee cultivation.

QUERIST.

For the American Bee Journal.

Stir up the Bees.

With me it is a rule of practice to handle bees often, as often as I have time to do so. The oftener bees are stirred up by proper handling the better they will labor. They will breed faster, gather more honey, and lay up larger stores of surplus. At least this has been my experience. Nearly all bee writers say that bees should not be disturbed when working in *boxes;* that if then disturbed they will refuse to work in them. This is an assertion that needs *proof.*

The best returns I have had from bees have been from those that have been torn in pieces, as it were, and then "put to rights" not less than twenty-five times in the course of six weeks! These frequent manipulations were necessary to show visitors the workings of my little favorites, and the value of frame hives. For the past eight years it has been my custom to set apart one or more hives for visiting committees—not wishing to disturb the main apiary; and these families have invariably given me better returns, in both swarms and honey, than those not thus disturbed.

Some of our popular writers advise us not to disturb bees unless it is absolutely necessary. It would be better to advise us to handle them often, but to do so properly. Very few bee-keepers handle their bees properly, but it is in their power to do so. A family of bees operated upon properly will not be irascible after the operation, but will remain in good humor during the season, even though manipulated with twenty-five or fifty times.

CAUTION.—Unless necessity demands it avoid disturbing bees when the consumption of honey and an increase of brood are not desirable. I handle my bees but very little after the honey season closes. M. M. BALDRIDGE.

ST. CHARLES, ILLINOIS.

For the American Bee Journal.

How to Multiply Bees.

Some bee-keepers are afraid to disturb their bees, thinking the bees will get discouraged at the interference of man.

I have managed a box hive, with glass set in the four sides of it, so as to make the bees breed fast and store a large amount of box honey, without discouragement by disturbing them. The four side doors covering the glass were thrown open, and rapping lightly on the glass late in the day, caused the bees to fill their sacs, and store the honey in the boxes that were on top covers, and not disturbed. The bees would carry all the honey in sight up above, and filled the cells with young bees in the hive below. Consequently more bees were hatched and more honey stored. Box hives can be raised to let in light, and blow smoke in the bottom and upon the hive at the same time will have the same effect.

They should be disturbed or handled at any time you want more brood raised. They should not be disturbed or handled when there is likely to be a scarcity of forage after as you increase the consumers.

All stocks that have a large quantity of honey in the spring should be handled often, even to the taking out the combs and cutting off the caps of honey cells. But the case is different in the latter part of the season. Then you want no increase of consumers. By handling the combs often the bees will retain their drones if

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WASHINGTON, JUNE, 1867.

☞ THE AMERICAN BEE JOURNAL AND GAZETTE is now published monthly, in the City of Washington, (D. C.,) at $2 per annum. All communications should be addressed to the Editor, at that place.

☞ This number closes the second volume of the AMERICAN BEE JOURNAL. Though the support it has thus far received has not been sufficient to cover the mere cost of paper and printing, the subscription list has been steadily increasing from the start. We shall continue the publication another year, believing that the growing interest manifested in it will soon place it on a paying basis. May we ask its friends to present it to the favorable notice of bee-keepers in their respective neighborhoods, and thus contribute to enlarge its circulation and extend the sphere of its usefulness! There are several such periodicals in Germany, one of which, issued semi-monthly, is now in its twenty-third year. The French Bee Journal is now in its eleventh year. It is true there is no similar publication in England, but may we not hope that one can and will be permanently sustained in the United States!

IN THE multiplication of stock by the division of colonies, it is necessary that the operator should understand *the principle* on which success depends, and be governed thereby. Without this he must ever remain a mere empiric, gratified when he attains his object, but unable to render a valid reason for the result, whether it eventuates in success or failure. It may be in season therefore to elucidate the theory and practice according to which such multiplication is effected; and of special advantage to assume that the work is to be done in the bee-keeper's own apiary—that is, that neither division of the colony operated on is to be removed to a new and distant location.

The fundamental principle is this, that the colony selected must be so divided that each division retains and contains whatsoever is indispensable to its continued existence as an independent organism. This is easily accomplished, where common hives are used, by drumming out the queen and a sufficient number of bees to constitute a colony, from a populous stock at the swarming season, when drones have already made their appearance—running these into a new hive, placing this where the mother hive stood, and removing the latter to a new location in the apiary. This is done at the usual swarming season, and a populous stock is selected, because at that season such a stock ordinarily contains eggs, larvæ and sealed brood in abundance. It consequently has within itself the means of speedily replacing its removed queen from the eggs or unsealed larvæ, by starting one or more royal cells; and a fresh worker force is rapidly supplied by the maturing sealed brood issuing in numbers from day to day. It has also ample stores of honey and pollen, and only needs be furnished with a little water daily, if long continued unfavorable weather follows the removal from its original location.

In the case of common hives, a new beginner or a timid operator is sometimes at a loss to know when the colony he proposes dividing is in a proper condition for the operation, and is apt to undertake it too early in the season. The hive must not only be populous, but must contain eggs, unsealed larvæ, and sealed worker brood maturing. It should also contain drones or drone brood nearly mature, unless there be drones or drone brood in some other colony in the apiary, or in its neighborhood. By inverting the hive and blowing in a little smoke from a segar or rotten wood, he will be able to see whether the comb contains worker and drone brood—the former being sealed with covers nearly flat, and the latter with covers considerably protuberant. Finding the requisite condition existing, he may proceed to drive out a swarm, and if he succeeds in expelling the queen also, he may confidently expect a favorable result.

But it is in dividing movable comb-hives that the novice is most apt to be disappointed. The same principle is to govern here, but the application of it is, to a beginner, not always so easy. He must supply to each division the means of maintaining not only present but permanent independent existence. He must remember that all the worker bees that have once flown out, will continue to return to their accustomed home on their return from subsequent excursions. The hive therefore, which is to contain the division to which a new location is assigned, must receive nearly all the young bees which have left their cells, but have not yet flown out, as only these will return to that hive when they fly out. It should also receive all the combs containing sealed brood nearly mature, and together with the old queen, a due share of the store of honey—though it is not necessary that the apportionment should be precisely equal, as a supply may be afterwards given to the division which appears to be in want. A comb containing pollen should also be given, as some will be needed for the unsealed larvæ and the new colony will not receive any fresh till the young have begun to fly; till then, also, water should be furnished in small quantities.

That division which is to remain in the original hive, on its old stand, and which may be termed the parent stock, must retain the unsealed larvæ, in its various stages, and the remaining stores of honey and pollen. It of course retains nearly all the old bees, since most of those transferred to the new hive will return to it again; and these will furnish the larvæ with the pollen and water which may be needed.

These are the essential principles by which the process of artificial multiplication is to be regulated. The operation is to be undertaken when external circumstances are favorable, and when the requisite conditions exist in the hive. It is obvious that the best time of day for this work is when most of the old bees are absent gathering honey; for then the larger portion of those transferred with the combs, or brushed off into the new hive, are such as have not yet flown out, and which will become attached to the new location. All of these, however, will not be secured, nor is it desirable that they should be, as some nurses are needed for the larvæ remaining in the parent hive.

Bee-Keeping in Poland.

The extent to which bee-keeping is carried in other countries, and the profit resulting from it, may be adduced in support of our opinion that bee culture should occupy a more prominent position than it does in our rural economy. Austria, Hungary, Bohemia, Moravia, and other parts of Germany, are noted for their bee-gardens; but they are all surpassed, both in number and productiveness, by the bee-gardens of Old Poland. In that country, there are cottages, with very small portions of land attached, where fifty hives may be counted: while in some districts, proprietors and farmers may be found who are possessed of from one hundred to ten thousand hives, and in others, there are nobleman who possess from twenty to eighty villages devoted, to a large extent, to the cultivation of the bee for its honey.

The profit derived from honey and wax is very considerable in these countries. The expense incurred is trifling, and the labor still more so, while the amusement afforded is very considerable. In Poland it assists the tenant to pay his rent, helps to defray his domestic expenses, and often enables him to accumulate a dowry for his daughters. In favorable seasons, when the weather is neither too hot nor too cold, too humid nor too dry, fifty old hives, which count a genealogy of centuries, will yield to the cottager from 100 to 150 new swarms, each swarm resembling a little cloud while hovering in the air. Even in the Muscovite provinces, on the Dnieper, which forms the boundary of Old Poland, and which in the winter is usually very severe, although they are obliged to protect their hives from the frost during winter, by placing them in large cellars built for the purpose, the inhabitants cultivate the bee with success.

The method pursued by the bee-masters in Poland is much less expensive, but more profitable; less scientific, perhaps, but more in accordance with the natural habits of the bee, than that pursued in this country The forests of Poland abound in pines, oaks, birches, beeches, and elders; but the timber chiefly used in the construction of hives is fir, cut into narrow deals. These boards should be an inch and a half thick, sound, and thoroughly seasoned, and they should be well joined together by means of wooden pins, so as to form a pyramidal house. The size generally adopted is eight inches at top, and twenty inches at bottom, increasing the diameter at the bottom two inches for every six inches above the indispensable height of three feet and a half. The top of the hive should be covered with a round lid, of the same board as the body of the hive, made so as to fit into the top, having a strong handle attached to it; over this lid is placed an earthenware or clay roof, with a sloping penthouse or ledge to throw off the rain. The hive should be corded round with rope about the thickness of a finger, twisted hard and painted over, so as to render it impervious to rain. This rope should be carried down to the middle of the hive.

An entrance is made in front for the bees by means of a triangular cut, each side of the triangle being an inch in length. A door is not absolutely necessary in a hive of this description, as the opening in the bottom answers every necessary purpose. But most bee-keepers make doors in the hive prepared for winter stock. This door is cut into the back of the hive, just opposite the triangular entrance for the bees, and should be about eighteen inches long and six inches wide, beginning at the middle of the hive, and descending towards the bottom.

In Poland almost every farm has its orchard, sheltered from the north winds by farm buildings, and generally a portion of land is set apart for a bee-garden. The landed proprietors who possess more extensive domains, choose for their bee-gardens low, dry situations, in a valley, at the foot of a hill, or on the borders of a forest:—these woodlands being generally planted so as to afford shelter to the bee-garden. Each garden is also surrounded by a close wooden fence, about six feet high, behind which a dry ditch is dug round the garden, to carry off rain and snow water, it being essential to keep the bee-garden perfectly dry. The ground on which the garden is formed must be kept clear from all sorts of injurious insects, and as bees use much water, a fountain or brook near at hand is essential to their well-doing.

When the hives are to be placed in a garden, the grass should be kept close. In the bee-gardens of Poland the turf is generally removed altogether, and the surface covered over with sand or gravel, well trodden down. When the turf is not altogether removed, it must at least be taken up for two feet round the hive, the space from which the turf has been removed

covered with clean, dry sand, about an inch thick, and well trodden down, before swarming time begins.

It is indispensable, also, that the hive be placed with the entrance towards sunrise. The east side of a hill is the favorite aspect for a bee-garden. In this situation the ground is cut into steps or terraces about five feet wide and three feet high. The hives on the second terrace are placed exactly midway between two placed on the first step, and so on; thus allowing the morning sun to fall upon the entrance of all the hives alike. The terraces thus prepared for the stand of the hive must also be strewed with clean, dry sand, about an inch thick. On this the hive is placed, without supports; but the bottom must be laid round with dry chips, or clean, dry moss, to prevent insects or vermin from creeping into the hive from the bottom.

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17. *Enchu.* This is a kind of wasp, about the size of a house fly; its head is black and the body yellow; it builds its hive in the branches of trees; this is of a papery tissue, of about three feet in circumference. Its honey is good.

18. *Enchu pequeno.* Very similar to the last, but it always makes a smaller hive; it also produces good honey.

The first eleven of these honey bees, construct their cells in the hollow trunks of trees, and the others either in similar situations or beneath the ground. It is only the last three kinds which sting, all the others being harmless. The only attempt I ever saw to domesticate any of these bees, was by a Cornish miner, in the gold district, who cut off those portions of the trunks of the trees which contained the nests, and hung them up under the eaves of the house. They seemed to thrive very well; but whenever the honey was wanted, it was necessary to destroy the bees.

Both the Indians and the other inhabitants of the country are very expert in tracing these insects to the trees where they hive. They generally mix the honey, which is very fluid, with farina before they eat it; and of the wax they make a coarse kind of taper, about a yard long, which serves them in lieu of candles, and which the country people bring to the villages for sale. We found these very convenient, and always carried a sufficient stock with us; not unfrequently we were obliged to manufacture them ourselves, from the wax obtained by my own men. A coarse soft kind of cotton yarn for wicks, was always to be purchased at the different fazendas and villages through which we passed.

[These melliponas might perhaps be successfully cultivated in the remote southern sections of the Union, but all attempts to introduce them as far north as Washington have utterly failed. The common bee (*apis mellifica*) is fast superseding them in Brazil.—Ed.]

"How Doth the Little."—Within the almost boundless sphere of natural history, perhaps there is no one subject more interesting and instructive than that within such a small body as that of the bee there should be contained apparatus for converting the "virtuous sweets" which it collects into one kind of nourishment for itself, another for the common brood, another for the royal, glue for its carpentry, wax for its cells, poison for its enemies, honey for its master; with a proboscis as long as the body itself; miscroscopic in its several parts, telescopic in mode of action, with a sting so infinitely sharp that, were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible; and this, too, a hollow tube; that these varied operations and contrivances should be enclosed within half an inch in length and two grains of matter, while in the same small room the large heart of at least thirty distinct instincts is contained, is surely amazing in an extraordinary degree.

Wildman puts the query as to why bees can endure the extreme cold of a Russian winter with impunity, while the inferior degree of cold of an English one proves so fatal; and he suggests, as an explanation, that the severe cold *freezes* the bees so that their juices cannot corrupt or putrefy, whereas cold in our climate is only sufficient to *chill* them, leaving their juices liquid and still capable of putrefication. But as it is well known that *frozen* bees do not revive, it is far more likely that the true solution of the matter is to be found in the *greater dryness* of the Russian climate; and that it is to *dampness* that our failures must be ascribed. Let this therefore be carefully guarded against in our preparations for wintering bees.

A hive made of straw will last for an indefinate length of time, if protected externally by a thick coat of whitewash, or, what is better, Roman cement. Oil paint should not be applied to a straw hive for this purpose.

It is the opinion of many experienced apiarians that a cold winter is not injurious to bees, provided they are sufficiently prepared for withstanding it.

A swarm of bees in May
Is worth a load of hay
A swarm of bees in June
Is worth a silver spoon;
But a swarm in July
Is scarcely worth a fly.

As the warm weather approaches do not forget to shade your hives from the sun.

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